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The Joy of X
Chapter 2 – Rock Groups

1. If you consider focus on groups of rocks between 10 and 20, draw the only rock group that can be rearranged into a square pattern.

2. For the rock groups between 1 and 10, draw the groups that can be neatly organized into a rectangle with exactly two even rows (2,4,6,8,10).

3. Use rock groups to show that 3+5=8 (odd + odd = even).

4. What is the only way that a rock group of 11 could be arranged? (Draw or describe).

5. Continue the pattern on page 10 to find the next two perfect squares (after 25). Show which numbers you added together to make them.

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6. Draw the rock picture of black and white L's (like on page 10) to show why 1+3=4 and why 1+3+5=9 are perfect squares.

7. A. Explain the professor's reasoning behind 1+2+3+...+9+10=55. Do you have any methods of your own (besides a calculator?)

   B. Use the professor's shortcut to find the sum of the numbers from 1 to 16. Show your work or explain your reasoning. (Just punching the problem into a calculator doesn't count!)

8. Give a brief reflection on this chapter. (If you're stuck on what to write, consider the following questions: Was there anything that was interesting? Anything new? Anything surprising? What parts made the most sense? The least sense? Do you see any applications of the ideas he talked about?)

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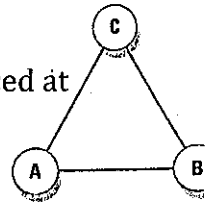
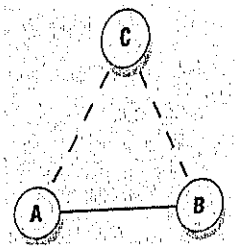
Chapter 3 – The Enemy of My Enemy

1. Fill in the pattern from page 16
   $-1 \times 3 = -3$
   $-1 \times 2 = -2$
   $-1 \times 1 = -1$
   $-1 \times 0 = 0$
   $-1 \times -1 =$

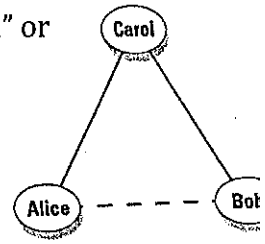
2.



   a. Explain why the triangle shows $+ \times + = +$. Is this triangle "balanced" or "unbalanced"? Why? (Note the explanation for balanced and unbalanced at the top of page 19).



   b. Explain why the triangle shows $- \times - = +$. Is this triangle "balanced" or "unbalanced"? Why?



   c. Explain why the triangle shows $+ \times + = -$. Is this triangle "balanced" or "unbalanced"? Why?

   d. Draw a different "unbalanced" triangle.

3. Pick one of the alliance configurations. Draw it below and explain why it is either balanced or unbalanced. (GB= Great Britain, F=France, R=Russia, I=Italy, G=Germany and AH= Austria-Hungary).

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Chapter 4 – Commuting

1. What is the commutative law of multiplication?

2. Draw dots arranged in two rectangles to show that $4 \times 5 = 5 \times 4$ (as on p. 25).

3. You are buying a $40 pair of shoes that are on sale for 10% off. The sales tax in Michigan is 6%. You have the option to apply tax first and then take the discount, or to take the discount first and then apply the tax. Which is a better deal for you? Why?

4. What is one (non-math) example where the commutative property *doesn't* hold?